U.S. Department
of Transportation

**Research and
Special Programs
Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

FEB 16 2005

DOT-E 10964
(TENTH REVISION)

EXPIRATION DATE: January 31, 2007

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Kidde Aerospace
(Former Grantee: Walter Kidde Aerospace, Inc.)
Wilson, NC

2. PURPOSE AND LIMITATIONS:

a. This exemption authorizes the manufacture, mark, sale and use of non-DOT specification cylinder conforming with all regulations applicable to a DOT specification 4DS cylinder, except as specified herein, for the transportation in commerce of the materials authorized by this exemption. This exemption provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein.

b. The safety analyses performed in development of this exemption only considered the hazards and risks associated with transportation in commerce.

3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.

4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 173.302a(a)(1) and 175.3 in that non-DOT specification cylinders are not authorized, except as specified herein.

5. BASIS: This exemption is based on the application of Kidde Aerospace dated February 1, 2005, submitted in accordance with § 107.109.

6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Proper Shipping Name/ Hazardous Material Description	Hazard Class/ Division	Identification Number	Packing Group
Compressed gas, n.o.s. (Mixture of Bromotrifluoromethane and nitrogen)	2.2	UN1956	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Prescribed packaging is non-DOT specification sphere made from welded seamless hemispherical domes, having configurations conforming to Walter Kidde Aerospace Inc.'s P/N 473476 (Drawing No. 473474 Rev. F dated December 10, 1993) and P/N 473477 (Drawing Nos: 473475 Rev. G dated December 10, 1993) and in accordance with other drawings and the procedures and quality assurance plan specified in their application on file with the Office of Hazardous Materials Exemption and Approvals (OHMEA). The spheres must be in conformance with DOT Specification 4DS (§§ 178.35 and 178.47), except as follows:

§ 178.35(c) *Duties of inspector.*

(1) and (2) * * *

(3) (Add)

(ix) Verify that material and design qualification tests prescribed in this exemption have been performed and modify reports as appropriate.

(4) * * *

§ 178.47(a) *Type, size, service and pressure.*

(1) Type and size. Fusion welded Titanium-15-3-3-3 alloy sphere as shown in the drawings referenced in paragraph 7 of this exemption. Water capacity not to exceed 100 pounds.

(2) Service pressure may not be over 80 percent of the vapor pressure of the contents at 130°F in pounds per square inch gauge.

§ 178.47(b) *Authorized Material.*

Type Titanium alloy 15V-3Cr-3Sn-3Al (Ti 15-3-3-3 alloy) conforming to the Aerospace Materials Specification (AMS) 4914, having a chemical composition as follows:

Element	Percent by weight	
	Min	Max
Vanadium	14.0 -	16.0
Chromium	2.5 -	3.5
Tin	2.5 -	3.5
Aluminum	2.5 -	3.5
Iron	-- -	0.25
Oxygen	-- -	0.13
Carbon	-- -	0.05
Nitrogen	-- -	0.05 (500 ppm)
Hydrogen	-- -	0.015(150 ppm)
Residual Elements, each	-- -	0.10
Residual Elements, total	-- -	0.40
Titanium remainder		

§ 178.47(d) *Manufacture.*

Add:

The design and manufacturing process for the vessel and attachments must be as described in the Walter Kidde application, and in conformance with the procedure used in the prototype vessel fabrication.

Lot definition. In this exemption, a "lot" means a group of spheres successively produced and having the same:

(1) Size and configuration;

(2) Specified material of construction;

(3) Process of manufacture and heat treatment;

(4) Equipment of manufacture and heat treatment;

(5) Conditions of time, temperature and atmosphere during heat treatment.

The lot size may not exceed 200 spheres, but any sphere processed for use in the required destructive testing need not be counted as being one of the 200.

§ 178.47(e) *Welding or brazing.*

Welding procedures must be as described in the Walter Kidde application.

§ 178.47(f) *Wall thickness.*

The minimum wall thickness for any sphere must be no less than 0.064 inches.

Minimum wall thickness must be such that the maximum wall stress does not exceed 85,000 pounds per square inch, at the marked service pressure.

The minimum design pressure is twice the service pressure.

(1) Calculation for sphere must be made by the formula:

$S = 0.25(PD/tE)$

where:

S = Wall stress in pounds per square inch.
P = Service pressure, psig.
D = Outside diameter, inches.
t = Minimum wall thickness, inches.
E = 0.85 (provides 85 percent weld efficiency factor which must be applied in the girth weld area and heat affected zone which zone shall extend a distance of 6 times wall thickness from center of weld); E = 1.0 (for all other areas).

(2) Does not apply.

§ 178.47(g) *Heat treatment.*

Seamless hemispheres are cold formed from stress relieved or annealed sheet stock. The welded vessel must be solution heat treated and aged before hydrostatic test, per the following schedule:

(1) Solution treat and age in a vacuum furnace at 1475 +/- 25°F for 20 +/- 2 minutes;

(2) Quench in Argon to below 200°F;

(3) Re-heat to 1050 +/- 25°F for 8 hours +/- 10 minutes;

(4) Quench in Argon to below 200°F.

§ 178.47(h) *Openings in container.*

(Add) Each fitting, boss, or pad attached to the container must be by fusion welding and must be of Titanium 15-3-3-3 alloy.

§ 178.47(i) *Process treatment.*

Process treatment not required.

§ 178.47(j) *Hydrostatic test.*

(1) thru (3) * * *

(4) Each sphere P/N 473476 must be tested to 1700 pounds per square inch, and each sphere P/N 473477 must be tested to 1555 pounds per square inch.

(5) * * *

§ 178.47(k) *Radiographic inspection*

Hundred percent radiographic inspection required on all welded joints. Specific acceptance rejection criteria must be clearly stated and approved by the inspector.

§ 178.47(l) *Burst test.*

One container from each lot of 200 or less, must be hydrostatically tested to destruction. The burst pressure must be recorded in the inspector's report.

§ 178.47(m) *Flattening test.*

Not required. However, the following is required:

(1) Prior to the initial shipment, each design must be qualified by cycling test which must be performed on at least three representative samples as follows:

(i) Each pressure vessel must be cycled by pressurization with water from zero to service pressure at a rate not exceeding 10 cycles per minute, and for a minimum of 10,000 cycles. Adequate recording instrumentation must be provided if the test equipment is operated unattended for periods of time. All spheres cycle tested must be condemned.

(ii) One pressure vessel taken at random from each lot must pass the test described in paragraph (1)(i) above for lot acceptance. The pressure vessel that was cycle tested may be used for the burst test.

(2) Physical test. Physical tests may be performed on specimens taken from sheet stock used in production, and must be subjected to the heat treatment process identical to the process used in the production of spheres.

(i) To determine yield strength, tensile strength, elongation, and percent reduction area of required on at least 2 specimens taken from the test sheet stock.

(ii) Specimens must be: Gauge length at least 24 times thickness with width not over six times thickness.

(iii) The yield strength in tension shall be the stress corresponding to permanent strain of 0.2 percent of the gauge length.

(iv) The yield strength must be determined by either the "off set" method or the "extension under load" method as prescribed in ASTM Standard E8-78.

(v) In using the "extension under load" method, the total strain corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension under appropriate load and adding thereto 0.2 percent of the gauge length.

(vi) For the purpose of strain measurement, the initial strain must be set while the specimen is under a stress of 12,000 pounds per square inch, the strain indicator being set at the calculated corresponding strain.

(vii) Cross-head speed of the testing machine must not exceed 1/8 inch per minute during yield strength determination.

§ 178.47(n) *Acceptable results of tests.*

(1) Not applicable

(2) The burst pressure must be at least 2070 pounds per square inch for the sphere P/N 473477, and 2266 pounds per square inch gauge for the sphere P/N 473476.

(3) Physical tests.

(i) Elongation at least 8% for gauge length 24 times the thickness.

(ii) Tensile strength not to exceed 175,000 pounds per square inch; yield strength is 140,000 pounds per square inch nominal.

(4) Cycling tests. Must pass the cycling tests prescribed in §178.47(m)(1) without failure by fracture, leakage, or by distortion.

§ 178.47(o) *Rejected spheres.*

Repair of welds is authorized after which reheat treatment is required, subsequent thereto acceptable spheres must pass all prescribed tests.

§ 178.35(f) and § 178.47(q) *Marking.*

Applies, except that:

(1) Instead of DOT-4DS, spheres must be marked "DOT-E 10964" followed by the service pressure.

(2) Marking by low stress type method such as electro-chemical etching, vibro -pen or laser marking, which does not decrease the integrity of the pressure vessel, is authorized.

(3) Stamping of elastic expansion is not required. The Test Pressure marking, (TP-_____) followed by the pressure at which the sphere was tested, for example, "TP-3000" must precede or be located immediately above the test date.

b. TESTING - Retest and requalification must be in accordance with § 173.34(e) as prescribed for DOT 4DS specification containers, except that the retest pressure must be that stamped on the sphere.

c. OPERATIONAL CONTROLS -

(1) Spheres are for aircraft use only.

(2) Spheres must be shipped in strong outside packagings in conformance with § 173.301(k). The spheres are acceptable for shipment with the properly approved actuating cartridges installed in the discharge outlet.

8. SPECIAL PROVISIONS:

a. In accordance with the provisions of Paragraph (b) of § 173.22a, persons may use the packaging authorized by this Exemption for the transportation of the hazardous materials specified in paragraph 6, only in conformance with the terms of this exemption.

b. A person who is not a holder of this exemption, but receives a package covered by this exemption, may reoffer it for transportation provided no modifications or changes are made to the package and it is offered for transportation in conformance with this exemption and the HMR.

c. A current copy of this exemption must be maintained at each facility where the package is offered or reoffered for transportation.

d. Each packaging manufactured under the authority of this exemption must be marked with a registration symbol designated by the Office of Hazardous Materials Exemptions and Approvals for a specific manufacturing facility.

e. A current copy of this exemption must be maintained at each facility where the package is manufactured under this exemption. It must be made available to a DOT representative upon request.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo aircraft only, and passenger-carrying aircraft.

10. MODAL REQUIREMENTS: A current copy of this exemption must be carried aboard each aircraft used to transport packages covered by this exemption. The shipper must furnish a current copy of this exemption to the air carrier before or at the time the shipment is tendered.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:

- All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, Parts 171-180.
- Persons operating under the terms of this exemption must comply with the security plan requirement in Subpart I of Part 172 of the HMR, when applicable.
- Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this exemption, including display of its number, when the exemption has expired or is otherwise no longer in effect.

12. REPORTING REQUIREMENTS: Shipments or operations conducted under this exemption are subject to the Hazardous Materials Incident Reporting requirements specified in 49 CFR §§ 171.15 - Immediate notice of certain hazardous materials incidents, and 171.16 - Detailed hazardous materials incident reports. In addition, the grantee(s) of this exemption must notify the Associate Administrator for Hazardous Materials Safety -- OHMEA, in writing, of any incident involving a package, shipment or operation conducted under terms of this exemption.

Issued in Washington, D.C.:

FEB 16 2005

Robert A. McGuire
Associate Administrator for
Hazardous Materials Safety

(DATE)

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590. Attention: DHM-31.

Copies of this exemption may be obtained by accessing the Hazardous Materials Safety Homepage at http://hazmat.dot.gov/exemptions Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

PO: ss/sln